



## CLINICAL ARTICLE

# The Effect of Consultation-Liaison Psychiatry on Postoperative Delirium in Elderly Hip Fracture Patients in the General Hospital

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**Objective:** The low recognition rate of postoperative delirium has gradually aroused clinical attention in China. The present study was to investigate the impact of consultation-liaison psychiatry on postoperative delirium in elderly hip fracture patients.

**Methods:** From March 2012 to September 2013, 89 patients with hip fractures hospitalized in Wuhan Mental Health Center were included in this prospective study as the consultation-liaison group. A total of 81 patients selected from August 2010 to February 2012 were defined as the conventional group. The delirium was evaluated using the confusion assessment method (CAM) recommended by the American Psychiatric Association guidelines.

**Results:** There was no difference of sex, age, trauma, surgical methods, and anesthesia between two groups ( $p > 0.05$ ). The consultation rate of consultation-liaison group was significantly higher than that of conventional group (37.07% vs 17.28%,  $p < 0.05$ ). After the consultation, there were 26 cases (78%) and nine cases (64%) of delirium in the consultation-liaison and conventional group, respectively ( $p > 0.05$ ). In the consultation-liaison group, three patients (9.09%) were diagnosed with anxiety and three patients (9.09%) were diagnosed with depression, while in the conventional group, three patients (21.42%) were diagnosed with communication and one patient (7.14%) was diagnosed with depression. In addition, this study showed the incidence of delirium in consultation-liaison group was significantly higher than that of conventional group (29.21% vs 11.11%,  $p < 0.05$ ). The average hospital stay in consultation-liaison group was significantly lower than that of conventional group ( $11.42 \pm 2.63$  vs.  $15.17 \pm 2.38$  days,  $p < 0.01$ ).

**Conclusion:** Consultation-liaison psychiatry could improve the recognition rate of postoperative delirium in elderly hip fracture patients, shorten hospitalization time. The training of mental health knowledge for non-psychiatrists could improve the ability of early identification and treatment of delirium.

**Key words:** aged; confusion; delirium; hip fracture; psychiatry

## Introduction

Delirium is an acute and reversible disorder of consciousness caused by a variety of factors and is a common postoperative complication in elderly patients<sup>1</sup>. It is characterized by fluctuations in cognitive functions such as cognition, emotion, attention, consciousness, self-awareness, and

psychomotor behavior. It is typically manifested as abnormal fluctuations in the state of consciousness, which often occur within a few hours to several days after surgery. According to the clinical manifestations, it can be divided into apathy type, agitated type, and mixed type. Of these, apathy type is difficult to recognize and diagnose<sup>2</sup>.

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It has been reported that the incidence of delirium in elderly patients after surgery is 25%–75%<sup>3</sup> and 40.0%–50.0% in elderly hip fracture patients, which may be related to most hip fracture patients undergoing emergency surgery, and often having metabolic disorders, malnutrition, and energy intake disorders caused by cerebrovascular diseases<sup>4</sup>. A retrospective study showed that hip fracture patients had higher hospital mortality, length of hospital stay, and discharge to residential aged care among Australian and New Zealand<sup>5</sup>. Moreover, delirium was identified as an independent long-term disability generator in a previous study<sup>6</sup>. Researchers found that a high level of clinical alertness was required in patients with delirium, as an appropriate treatment of acute diseases could reduce their high mortality risk.

Consultation and liaison psychiatry means that psychiatrists participate in the work of a multidisciplinary team in a regular and integrated manner<sup>7</sup>. The forms of participation include psychiatric consultation, ward rounds, ward case discussions, and improvement of basic psychiatry by other doctors through teaching and training. Wood *et al.*<sup>4</sup> systematically reviewed 40 studies on the cost-effect analysis of liaison consultation psychiatry and found that for inpatients in general hospitals, the service model of consultation liaison psychiatry has a good cost-effectiveness and can effectively reduce the length of hospital stay of patients. Liaison psychiatry has increasingly become the “standard service” of hospitals in Western developed countries. According to a survey conducted by Naidu *et al.*<sup>8</sup> in the Greater London area, 96.3% of the liaison psychiatric teams in this area can provide services to elderly patients in 2012, compared with 63.0% in 2004. It has been reported that the proportion of inpatient psychiatric consultations was <5%, and the recognition rate of mental disorders by clinicians was also low, less than 50%. This may be related to the low recognition rate of mental disorders in general hospitals. The inadequate treatment of patients leads to prolonged hospitalization, increased consumption of medical resources, and increased mortality<sup>8</sup>. Previous study has shown that consultation-liaison psychiatry may have a positive impact on the correct diagnosis of elderly inpatients, the selection of appropriate treatment, and the reduction of hospital stays<sup>4</sup>. Mental disorders are common among elderly inpatients in general hospitals, especially elderly patients after hip fracture surgery. Combined mental disorders can lead to longer hospital stays, increased medical costs, and increased mortality, thus the identification and management of mental disorders in the early stage have an important impact on the prognosis of patients<sup>4</sup>. Studies have shown that the proportion of delirium is the highest through consultation-liaison psychiatry, reaching 42%, but this proportion is much lower than the proportion of delirium in hospitalized patients shown in the existing data, ranging from 6% to 56%<sup>4</sup>. These results indicated that the recognition rate of delirium is low, or general practitioners may have insufficient understanding of the importance of dealing with delirium. Therefore, how to improve the recognition rate and processing ability of delirium in general hospitals is particularly important.

There are few reports on consultation-liaison psychiatry in elderly inpatients in China at present, and the low recognition rate of postoperative delirium has gradually aroused clinical attention. Psychiatrists urgently need to clarify whether consultation-liaison psychiatry can have a positive impact on postoperative delirium and develop comprehensive intervention measures for patients with postoperative delirium to realize the advancement of mental service defense.

Therefore, the main goals of this study are to: (i) identify and intervene postoperative delirium in elderly hip fracture patients through consultation-liaison psychiatry; (ii) explore the cause of delirium; (iii) provide a reference for comprehensive intervention measures for postoperative delirium.

## Materials and Methods

### *The Inclusion and Exclusion Criteria*

Inclusion criteria: (i) patients age  $\geq 60$  years old; (ii) patients with hip fractures.

Exclusion criteria: (i) patients with clinical craniocerebral organic lesions through physical examination and CT scan of the brain; (ii) combined with severe Alzheimer's disease; (iii) history of mental illness and abuse of psychotropic drugs and alcohol.

### *Included Patients*

From March 2012 to September 2013, 89 patients with hip fractures hospitalized in our hospital were included and defined as the consultation-liaison group. The patients with hip fractures hospitalized in orthopaedics department consecutively from August 2010 to February 2012 were selected in the conventional group, and a total of 81 patients were enrolled. The hospital medical records of these patients were collected. The study was registered at Chinese Clinical Trial Registry (No. ChiCTR2200055446). This study was approved by the ethics committee of Wuhan Mental Health Center (No. KY2010.01) and was performed in accordance with the principles of the Declaration of Helsinki. The informed consent forms were obtained from all patients. Wuhan Mental Health Center is tertiary hospital on mental health in Hubei province.

### *Research Methods*

Consultation-liaison group: Before the study began, contact psychiatrists to train all orthopaedic doctors and nurses involved in the study on the common mental problems of elderly hip fracture patients, understand how to identify and deal with mental diseases in early stage, and perform the delirium evaluation scale to learn how to conduct CAM. A consistency test was carried out ( $\kappa = 0.87$ ). After the start of the study, contact psychiatrists to provide a psychological consultation to the patients before and 24 h after the operation, which aimed to relieve their anxiety and tension, and correct bad cognition. CAM assessment was performed at about 9:00 every night. If the patient was diagnosed with

postoperative delirium by CAM, a psychiatrist was contacted to confirm the diagnosis according to the *DSM-IV* standard, and antipsychotic drugs were used for their treatment as appropriate. During the hospitalization, dynamic monitoring was carried out based on CAM assessment to prevent recurrence of delirium. If there were repeated occurrences, contact the psychiatrist for consultation in time to find out the reason and assist in diagnosis and treatment.

Conventional group: conventional treatment and care were applied in these patients. For patients with obvious psychiatric symptoms after surgery, psychiatrists were contacted and consulted to assist in diagnosis and treatment, and antipsychotic drugs were used as appropriate while controlling the risk factors for delirium. Not combined with CAM assessment and dynamic monitoring.

### Indicators

#### Confusion Assessment Method

The delirium was evaluated using the confusion assessment method (CAM) recommended by the American Psychiatric Association guidelines<sup>9</sup>. CAM is a more concise diagnostic system based on *Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV)*, which is suitable for non-mental health professional clinicians to identify delirium. The rapid diagnosis of delirium only requires the following four characteristics: (i) acute onset, fluctuating condition; (ii) inattention; (iii) disordered thinking; (iv) altered level of consciousness. The diagnosis of delirium requires the presence of (i) and (ii) at the same time, and the combination of (iii) or (iv) or both. The entire evaluation process takes less than 5 min and is suitable for rapid diagnosis of delirium<sup>10</sup>.

#### Anxiety

Anxiety can be divided into acute anxiety (panic attack) and chronic anxiety (generalized anxiety). For the acute anxiety, mild type should meet the following 1–4 items and severe type should meet the following 1–5 items: (i) the episode has no obvious inducement, no relevant specific scenarios, and the episode is unpredictable; (ii) in the intermittent period, there are no obvious symptoms except for fear of recurrence; (iii) strong fear, anxiety, and obvious autonomic symptoms during the episode, and often have painful experiences such as fear of death and sense of loss of control; (iv) the episode starts suddenly and reaches a peak quickly. The consciousness was clear during the episode and can be recalled afterwards. (v) the patient feels pain because it is unbearable and unable to escape. The criteria for the course of the disease are at least three of the above-mentioned attacks within 1 month, or the anxiety of fear of recurring after the first attack lasts for 1 month.

For the chronic anxiety, mild type should meet the following 1–2 items and severe type should meet the following 1–3 items: (i) frequent or persistent fear or worry without clear object and fixed content; (ii) accompanied by

autonomic symptoms or motor anxiety; (iii) the social function is impaired, and the patient feels pain because it is unbearable and unable to escape. The course of the disease meets the above symptoms for at least 6 months.

#### Depression

The diagnosis of depression should meet all three criteria as follows: (i) sustained attacks need to last at least 2 weeks; (ii) in the patient's past, there was no hypomanic or manic episode that was sufficient to meet the criteria for hypomania or mania; (iii) the episode is not caused by psychoactive substances or organic mental disorders.

#### Statistical Analysis

In this randomized controlled trial, patients would be allocated to consultation-liaison group and conventional group. The study was designed two-side 5% type I error and 90% power. The study was powered to detect 70% identification rate of delirium in consultation-liaison group and 50% in conventional group. The estimation of sample size was in accordance with the following formula:  $n = \frac{2\bar{p}\bar{q}(Z_{\alpha} + Z_{\beta})^2}{(p_1 - p_2)^2}$ , and 76 cases were estimated in each group. Considering a 10% expulsion rate, 83 cases should be included in each group at least.

All the data collected in this study were analyzed using SPSS 22.0 software. Normally distributed measurement data were expressed as mean  $\pm$  standard deviation (SD), and the comparisons were examined by Student *t*-test. The categorical data were expressed as *n* (%), and the differences between the two groups were examined by chi-square analysis or Fisher's exact test.  $p < 0.05$  was considered statistically significant.

### Results

#### Baseline Data

In this study, 89 patients were included in the consultation-liaison group, including 37 males and 52 females, with an average age of (73.05  $\pm$  5.07) years old. In addition, a total of 81 patients were enrolled in the conventional group, including 33 males and 48 females, with an average age of (72.19  $\pm$  6.53) years old. There were no significant differences in gender, age, trauma, surgical methods, and anesthesia between the two groups ( $p > 0.05$ ) (Table 1).

#### Mental Disorder

There were 33 cases (37.07%), and 14 cases (17.28%) were assessed as delirium and consultation-liaison psychiatry was performed subsequently in consultation-liaison group and conventional group, respectively ( $p < 0.05$ ). Of these, 26 cases (78.79%) were diagnosed with delirium, three cases (9.09%) with anxiety, three cases (9.09%) with depression, and one case with other disease (3.03%) in consultation-liaison group. There were nine cases (64.29%) diagnosed with delirium after the consultation, three cases (21.42%) with anxiety, one

**TABLE 1** Comparison of baseline data of patients between experimental group and control group.

	Experimental group (n = 89)	Control group (n = 81)
Gender (male/female)	37/52	33/48
Age (years old)	73.05 ± 5.07	72.19 ± 6.53
Fracture types		
Femoral neck fractures	45	41
Intertrochanteric fractures	32	32
Subtrochanteric fractures	12	8
Surgical approach		
Internal fixation	46	41
Joint replacement	43	40
Anesthesia		
Local anesthesia	59	53
General anesthesia	30	28
Comorbidities		
Respiratory diseases	20	15
Cardiovascular diseases	25	22
Endocrine diseases	14	9
Diseases of digestive system	5	2
Diseases of urinary system	8	2

case (7.14%) with depression, and one case with other disease (7.14%) in conventional group. There was no difference of diagnosis of mental disorder between two groups after consultation ( $p > 0.05$ ) (Table 2).

Subgroup analysis showed that there was no difference of patients' sex distribution (male/female) on consultation rate (15/18 vs 5/9), CAM (10/16 vs 5/4), depression (1/2 vs 1/0), and anxiety (2/1 vs 2/1) rate between consultation-liaison group and conventional group (all  $p > 0.05$ ) (Table 3).

### Incidence of Delirium and Hospital Stay

In this study, the incidence of delirium in the consultation-liaison group was significantly higher than that of conventional group (29.21% vs 11.11%,  $p < 0.05$ ). However, the average hospital stay in the study group was significantly lower than that in the conventional group ( $11.42 \pm 2.63$  vs  $15.17 \pm 2.38$  days,  $p < 0.01$ ).

## Discussion

Studies have shown that the recognition rate of delirium is low, or the general practitioners may have insufficient understanding of the importance of dealing with delirium<sup>11</sup>. Therefore, how to improve the recognition rate and processing ability of delirium in general hospitals is particularly important.

### Cause of Delirium

In this study, 33 cases (37.07%) were assessed as delirium based on the CMA results and consultation-liaison psychiatry was performed in the consultation-liaison group, while 14 cases (17.28%) were contacted by the psychiatric consultation in the conventional group. The reason might be the research team contacted the psychiatrist to train the orthopaedic clinicians on mental disorders of elderly patients prior to the study. The training could improve the ability of non-psychiatric medical staff to recognize and deal with psychiatric diseases, thereby increasing the rate of contact consultation. In addition, CAM could provide non-psychiatrists with the ability of more accurate diagnosis of delirium to avoid missed diagnosis, misdiagnosis, or over-medication, which was consistent with previous study<sup>10,12</sup>. There was no difference of diagnosis between the two groups after consultation. Among these, the incidence of delirium was the highest, indicating that postoperative delirium was common in elderly hip fracture patients and should be paid more attention to improve their prognosis<sup>13</sup>. Meanwhile, it is necessary to identify and deal with postoperative depression or anxiety in elderly patients to prevent negative emotions or other accidents.

In this study, the incidence of postoperative delirium in the study group was significantly higher than that in the conventional group, which may be related to the following reasons:

1. After training, the orthopaedic medical staff has enhanced their ability to recognize delirium. According to the clinical manifestations of delirium, it is divided into three subtypes: motoric subtype, hypoactive subtype, and mixed subtype. Motoric delirium manifests as increased alertness, hallucinations, delusions, and restlessness, accounting for about 25%. This type is easy to identify. Hypoactive delirium manifests as decreased alertness, sedation, and decreased motor activity. It is more common in elderly patients, accounting for about 50%.

**TABLE 2** Comparison of psychiatric consultation-liaison data of patients between experimental group and control group.

	Experimental group (n = 89)	Control group (n = 81)	$\chi^2$	$p$
Cases of consultation	33 (37.07%)	14 (17.28%)	8.31	0.003
Diagnosis after consultation				
Delirium	26 (78.79%)	9 (64.29%)	1.08	0.290
Depression	3 (9.09%)	1 (7.14%)	0.12	0.720
Anxiety	3 (9.09%)	3 (21.43%)	0.46	0.490
Other	1 (3.03%)	1 (7.14%)	0.02	0.870



**TABLE 3** Subgroup analysis of patients with different sex (male/female).

Variables	Consultation group	Control group	p-value
Consultation	15/18 (45.45%/54.55%)	5/9 (35.71%/64.29%)	0.53
CAM	10/16 (30.30%/48.48%)	5/4 (35.71%/28.57%)	0.37
Depression	1/2 (3.03%/6.06%)	1/0 (7.14%/0.00%)	0.24
Anxiety	2/1 (6.06%/3.03%)	2/1 (14.28%/7.14%)	>0.999

However, this type is not easy to diagnose and has a poor prognosis. The mixed type shows that the first two states appear alternately<sup>14</sup>. Non-psychiatrists can easily identify motoric delirium, but it is difficult to identify the latter two subtypes of delirium, resulting in a significantly lower incidence of the conventional group compared with the consultation-liaison group.

- The use of quantitative assessment methods could make early diagnosis more accurate. Due to the lack of specific clinical diagnostic test methods, the symptoms are diverse and fluctuating. Clinical diagnosis and treatment of delirium are mostly based on clinical experience, resulting in uncertainty in diagnosis and treatment<sup>15</sup>. Therefore, by contacting a psychiatrist for scale training and guidance, this study improved the recognition and diagnosis rate of delirium by medical staff, which was conducive to more standardized treatment.
- Contacting a psychiatric consultation is conducive to improving the consultation rate of delirium. The patients in the conventional group were invited to consult with the psychiatric department after showing obvious psychiatric symptoms, which meant that they were still in the stage of traditional reactive consultation mode. In the consultation-liaison group, the research team contacted the psychiatrist before the operation to train the orthopaedics staff on psychiatric knowledge, provided psychological counseling to the elderly patients, and continued to provide psychological counseling to the patients after the operation. The inter-connection may provide a good reference for the expansion of contact consultation.

#### Advantages of Consultation-Liaison

In addition, the incidence of delirium in the consultation-liaison group was significantly higher than that in the conventional group, while the average hospital stay in the study group was significantly lower than that in the conventional group. These results suggested that consultation-liaison psychiatry could significantly improve the recognition rate of delirium and facilitate diagnosis and treatment in the early stage, which shortens the length of hospital stay. Meanwhile,

contacting a psychiatrist before and after surgery to provide psychological counseling to elderly patients played an important role in relieving anxiety, correcting poor cognition, and reducing the risk factors for delirium.

#### Shortcoming

The shortcoming of this study is that the sample size was small, no follow-up was performed, and only the elderly hip fracture patients were studied. In future research, we will expand the sample size, and conduct in-depth discussions and follow-up on different physical diseases combined with delirium to establish a more complete consultation-liaison psychiatry system.

#### Conclusion

Consultation-liaison psychiatry could improve the recognition rate of postoperative delirium in elderly hip fracture patients, shorten hospitalization time. The training of mental health knowledge for non-psychiatrists could improve the ability of early identification and treatment of delirium.

#### Author Contributions

Qin Xie and Guang-Wu Jing contributed to the conception and design of the study. All authors participated in the clinical practice, including diagnosis, treatment, consultation, and follow-up of patients. Xiao-Bo Liu and Xue Jiang contributed to the acquisition of data. Hong Liu and Bao-Liang Zhong contributed to the analysis of data. Qin Xie wrote the manuscript. Xiao-Bo Liu and Guang-Wu Jing revised the manuscript. All authors approved the final version of the manuscript.

#### Funding Information

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#### Disclosure

The authors declare no conflict of interest.

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